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Vol. 1, No. 10

Science and Technology Perspectives

DEVELOPMENTS

TECHNOLOGY EXCHANGE EXHIBITION

From 4 to 7 November, the Milan Trade Fair will host "TECH EX '86," an international exhibition focusing on East-West technology exchange. The Soviet company Litsensintorg will participate and present 2,000 patents supplied by various Soviet ministries. In addition, the East European firms Polytechna (Czechoslovakia) and Akadimpex (Hungary) will sponsor exhibits. For more information, contact

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FEATURE ARTICLES

FRANCE/FRG: Development of A-330, A-340 'No Matter What' Page 3

France and the FRG will continue to develop the A-330 and A-340 despite the breakdown of talks with McDonnell Douglas and waivering British participation.

HUNGARY: Gallium Arsenide Technology Page 5

Innovations in Hungarian gallium arsenide production technology may increase domestic production of the compound and provide the means necessary to establish a nationwide optical fiber communications system.

ITALY: Improvements in Steel Technology Page 7

Under the auspices of the European Coal and Steel Community, the Italian steel industry is conducting research on the processes used in continuous casting steel technology.

USSR: Neutrino Beams To Be Used in Tomographic Earth Studies Page 9

Soviet scientists will use neutrino beam tomography to scan the Earth's geologic structure.

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PERSPECTIVES selections are based solely on foreign press, books and journals, or radio and television broadcasts. Some of the materials used in this publication will appear as abstracts or translations in FBIS serial reports. Comments and queries regarding this publication may be directed to the Center Chief, to individuals at the numbers listed with items, or to the Science and Technology Center at

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DEVELOPMENTS highlights worldwide S&T events reported in the foreign media. Items followed by an asterisk will be published by FBIS. The contributor's name and telephone number are provided.

Astronautics Association

(Hungary) The Hungarian Astronautics Association (MANT), the successor to the Central Department of Astronautics, was formed recently in Budapest. Ivan Almar is MANT chairman; Attila Baj, Bertalan Farkas, and Karoly Szego, are vice chairmen; Tamas Gombosi is first secretary. Work committees and a 23-member presidium were also elected. Enterprises and institutions can become members of MANT, which will provide them with an outlet to market instruments developed for space research. (Budapest MAGYAR NEMZET 20 Sep 86) [redacted]

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Aircraft Brakes

(UK) Dunlop Aerospace Group is working with Abex Aerohydraulic on a "brake-by-wire" concept for aircraft. The computerized system, including both hardware and software, would provide fully redundant electric sensing and control of the entire braking operation. This concept is being considered for inclusion in the European Fighter Aircraft. (Paris AIR & COSMOS 20 Sep 86) [redacted]

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Computer Imports

(Hungary) Statistics for 1985 show that Hungary has a computer inventory of nearly 20,000 machines. Of these, 4,600 were manufactured in Hungary while over 15,000 were imported primarily from non-Bloc countries. These figures include 1,500 mini and 17,000 microcomputers. The computer inventory has an average age of 2.34 years. (Budapest TARSADALMI SZEMLE Nos 8-9, 1986) [redacted]

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Eureka 64-Megabit Chip

(Belgium) The Belgian Chemical Union (UCB), using its new photoresist "Plasmask," expects to make a 64-Mbit chip available within a few years. Research on "Plasmask," which can reduce chip feature size to 0.4 microns, will be continued with Eureka funding under the project DESIRE (Diffusion Enhanced Silylating Resist). (Groot-Bijgaarden DE STANDAARD 17 Sep 86)* Antwerp Unit/ [redacted]

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Integrated Circuits

(France) Next year European Silicon Structures (ES2) plans production of integrated circuits with very short cycle times. The circuits will be manufactured at a factory now under construction near Aix-en-Provence. European systems manufacturers are the primary market for the special ICs. (Paris L2i01 Data Base 3 Sep 86) Antwerp Unit/ [redacted]

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Magnetic Disk Memories

(Hungary) MOM, the Hungarian Optical Works, is manufacturing the DM 2.5, the newest member of its DISC-MOM series. It is a fixed-head high-capacity magnetic disk memory with a 2.5 Mbit modular electronic unit that is inexpensive, reliable, and easy to maintain. It can be used as a main or an add-on memory to store large amounts of data. (Budapest NEPSZABADSAG 4 Sep 86) [redacted]

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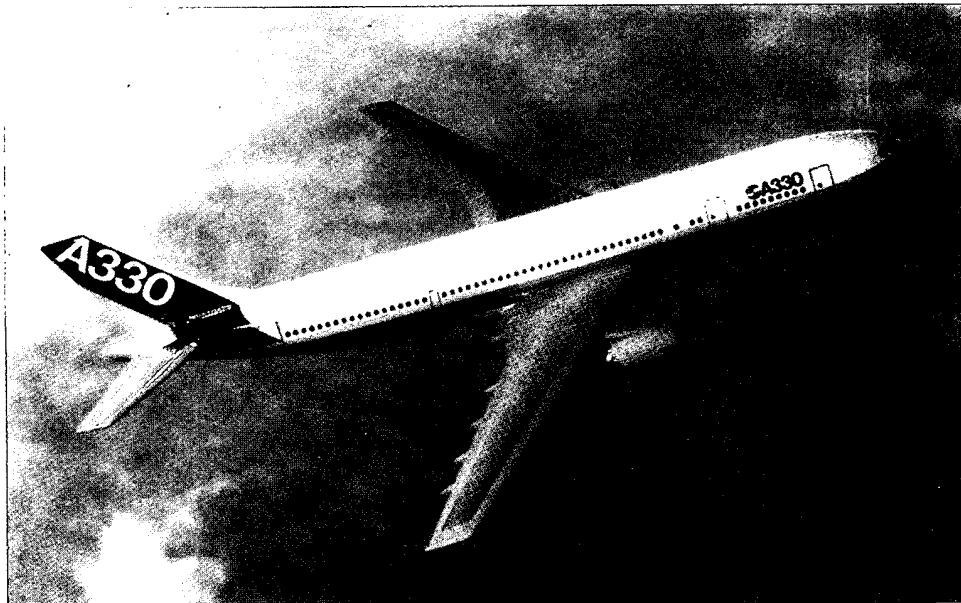
Mobile Telephone	(Mexico/France/Finland) Mexico has signed a Fr30 million contract to purchase Radiocom 2000 mobile telephones from Matra Communication, which recently formed a subsidiary with Nokia Mobira (Finland) to produce Radiocom 2000 units to French system specifications. Matra expects first-year sales to reach Fr150 million. (Paris LE NOUVEL ECONOMISTE 12 Sep 86; Paris LES ECHOS 9 Sep 86)* [redacted]	STAT
Naval Radar System	(France/UK/Italy) Thomson-CSF, Marconi, and Selenia have signed a cooperation agreement in which the firms will budget Fr500 million for production by 1990 of a new naval radar system called EMPAR (European Multifunction Phased Array Radar). The radar is intended for use by NATO in conjunction with its planned Local Area Missile System (LAMS). (Paris AIR & COSMOS 13 Sep 86)* [redacted]	STAT
Nuclear Reactor Talks	(USSR/Japan) The USSR has renewed talks with Japan for the purchase of Japanese pressurized light water reactor (PLWR) technology. Previous confidential talks between the two countries for the sale of 10 PLWRs were inconclusive. Kazuhisa Mori, director of the Japan Atomic Energy Industrial Forum, noted that the Soviet 12th Five-Year Plan calls for PLWR technology as part of a drive to boost domestic nuclear power production. (Tokyo NIKKEI SANGYO SHIMBUN 2 Sep 86) [redacted]	STAT
Samsung's 256K SRAM	(South Korea) Samsung Semiconductor Communications has developed a 256K SRAM (static random access memory) chip of completely domestic design and technology. South Korea regards the chip's development as proof that its technology is equivalent to that of the US and Japan. Although equivalent in memory capacity to the 256K DRAM, the 256K SRAM will cost seven times more to produce. The chip is used in large high-speed computers, portable computers, and word processors. Samsung will market the 256K SRAM in 1987 and anticipates \$490 million in sales the first year, growing to \$1.1 billion by 1988. (Seoul CHUNGANG ILBO 8 Sep 86) [redacted] [redacted]	STAT STAT
Satellites	(France/Sweden) The Swedish space agency, Rymdbolaget, has announced that the Spot 1 reconnaissance satellite launched on 22 February is experiencing transmission difficulties. The problem, which does not affect image quality, has been traced to one of the satellite's two recorders manufactured by the US firm Odetics. (AFP from AGRA Data Base 18 Sep 86)* Antwerp Unit/ [redacted] (France) The director of the French National Center for Space Studies (CNES) spoke of close civilian-military cooperation in the fields of telecommunications and reconnaissance satellites. Preparations for a military package on Telecom 2 are continuing as is planning for the Helios military reconnaissance system, which will be coordinated with the Spot program. The Helios and Spot satellites will have polar orbits at altitudes of 400km and 800km respectively. (AFP from AGRA Data Base 12 Sep 86)* Antwerp Unit [redacted]	STAT STAT

FOR OFFICIAL USE ONLY**FRANCE/FRG: DEVELOPMENT OF A-330, A-340
'NO MATTER WHAT'**

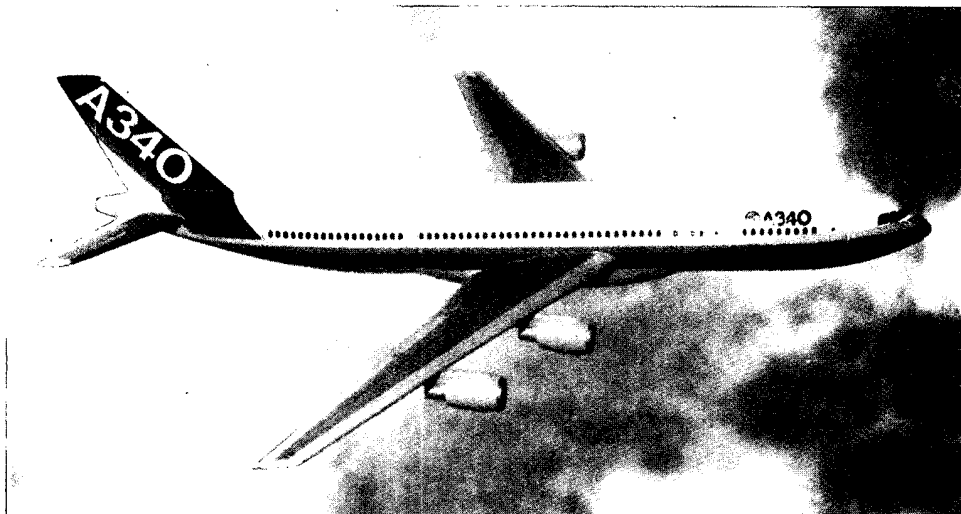
Key Points: France and the FRG are determined to develop the A-330 and A-340 without McDonnell Douglas or the UK, should the British Aerospace contract falter. Paris and Bonn have made major allocations to ensure that the program remains on track. Development work is slated to begin in March 1987.

France and the FRG will proceed with development of the A-330 and A-340 despite the breakdown of the talks with McDonnell Douglas and the possible loss of UK participation. (For previous coverage of the Airbus-McDonnell Douglas talks, see SCIENCE AND TECHNOLOGY PERSPECTIVES, Vol. 1, No. 5 pp 4-5.) AFP reported on 10 September that Airbus Industrie managing director Jean Pierson will no longer negotiate with McDonnell Douglas on combining the A-340 and MD-11. Pierson argued that Airbus needs a "complete line" of its own aircraft to consolidate its market position. Prime Minister Chirac bluntly announced on 11 September that France, in collaboration with the FRG, will develop the A-330 and A-340 "no matter what."

A-330



To keep the program on track, the French Government has allocated Fr115 million to Aerospatiale and other French equipment manufacturers for preliminary studies in 1987. Nonetheless, Airbus Consortium members (France, the FRG, the UK, and Spain) expect that large additional subsidies will be required. In a 12 September commentary, the FINANCIAL TIMES observed that despite budgetary constraints, Paris will continue to fund the program because it involves not only national pride but the health of the economy. A serious setback would mean layoffs at Airbus' Toulouse assembly plant with a ripple effect throughout the country's aerospace industry.

FOR OFFICIAL USE ONLY*A-340*

The FRG, for its part, announced in July a DM200 million subsidy for the A-330 and A-340. Lufthansa has expressed a strong interest in the A-340. The FINANCIAL TIMES noted, however, that FRG funding of Airbus is only partially driven by Lufthansa. Bonn's main motive is the use of Airbus production to bolster its own competitiveness in the commercial aircraft market. (For a discussion of possible West German strategies to compete in the R&D market, see SCIENCE AND TECHNOLOGY PERSPECTIVES, Vol. 1, No.9 pp 9-10).

The French appear ready to ignore UK "reservations" over participation in Airbus, according to AFP. The British Government will provide only part of the funds needed by British Aerospace (BAe) to develop the wings for the two aircraft. Should BAe fail to raise the remainder, the company would have to forfeit its contract to a competitor.

Antwerp Uni

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HUNGARY: GALLIUM ARSENIDE TECHNOLOGY

Key Points: Innovations in Hungarian gallium arsenide (GaAs) production technology, using equipment designed in Hungary, could result in the doubling of domestically produced GaAs. Hungary may apply this technology to the development of an optical fiber communications network.

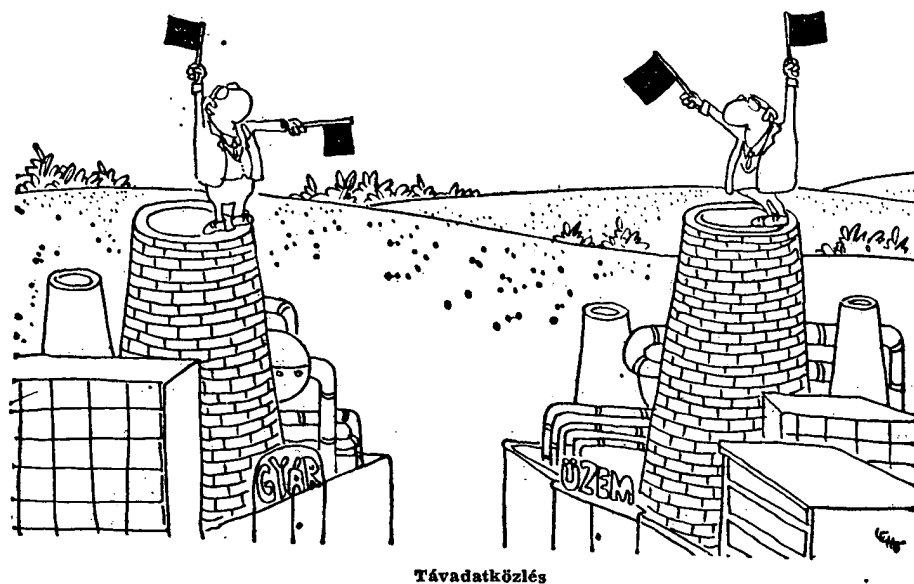
Hungary refines 2 to 3 tons of GaAs from bauxite annually and could produce nearly twice as much, according to a 13 September NEPSZABADSAG interview with Dr Odon Lendvai, head of the Technical Physics Research Institute (MFKI) of the Hungarian Academy of Sciences. He observed, however, that only a small percentage of the compound is used in Hungary and that most is exported to Japan. Lendvai made his comments as organizing chairman of the Second CEMA Conference on the Physics and Technology of Gallium Arsenide held in Budapest in early September.

Lendvai stated that Hungary has an ongoing research program in GaAs and related compounds. The MFKI has developed techniques that have been adopted by the USSR's Ioffe Institute and other Bloc research institutes. Lendvai noted that specialists from outside the Bloc have visited the MFKI to examine the experimental equipment used to create superlattices with the desired electrical properties. Lendvai commented that the institute's GaAs process begins with drawing the semiconductor crystal from a GaAs or indium melt. This differs from other methods in which crystal growth begins with a gas phase. He asserted that this MFKI-designed equipment represents leading-edge technology, allowing production that previously could only have been possible using COCOM-embargoed equipment. Moreover, Lendvai claimed that the equipment costs \$40,000 against \$2 million for equivalent COCOM-controlled items. The MFKI's production capability, however, is described as "average" compared to the output of non-Bloc facilities.

Hungary hopes to use this technology in the production of semiconductors for optical fiber communications—a possible solution to the country's outmoded telephone system. The techniques will be applied to the fabrication of diodes capable of transforming electricity into light or light into electrical impulses. The MFKI has developed a laser transmitter and a detector capable of receiving light signals. Additional equipment is being developed jointly with the Telephone Factory. The Hungarian Postal Service plans to begin testing the system next year.

The cartoon, on the next page, from the economic weekly FIGYELO is a comment on Hungary's telecommunications dilemma.

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Telecommunications

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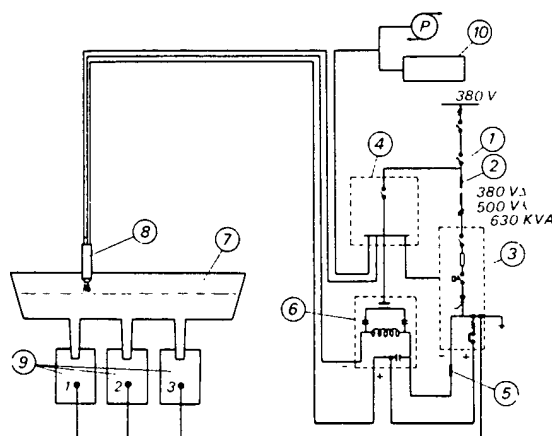
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ITALY: IMPROVEMENTS IN STEEL TECHNOLOGY

Key Points: The European Coal and Steel Community (ECSC) is financing research to improve the thermal and mechanical processes used in continuous casting steel technology. Conducted in Italy, the research is seeking ways to bolster the output, quality, and competitiveness of West European steel, according to July reports in Milan's BOLLETTINO TECNICO FINSIDER.

The ECSC-sponsored research is an attempt to upgrade continuous casting thermal processes through the cooling of the mold and by the use of plasma torches to reheat the molten steel in the pouring basin. Techniques to improve mechanical procedures focus on the application of sensors and computers to monitor conditions associated with steel breakouts and to detect minute surface defects in cold and hot steel slabs.

The Italian Metallurgical Experimental Center (MEC) and the Terni Steelworks under a grant from the ECSC have developed a new technology—forced acceleration of solidification technology (FAST)—for increasing the output and product quality of continuous casting steel mills. FAST involves the feeding of metal powders to molten steel when cast from the tundish (pouring basin) into the mold. The process extracts the steel's superheat (the extra heat associated with the creation of vapors in liquid steel) from the mold. This permits centers of heterogeneous nucleation (particles present in the molten steel) to form in the molten liquid but inhibits columnar growth during solidification. The result is low-reduction-ratio steel free of internal defects, macrosegregation, and axial porosity.



Plasma torch reheat system: schematic view

- | | |
|---------------------------------|------------------------|
| 1) main breaker rated at 1200 A | 6) HF ignition circuit |
| 2) three phase transformer | 7) tundish |
| 3) SCR power supply | 8) plasma torch |
| 4) control console | 9) moulds 1 - 3 |
| 5) self-inductance | 10) heat exchanger |

The MEC has also experimented with reheat techniques to control the temperature of molten steel in the tundish of continuous casting machines. Reheating maintains all strands at a uniform temperature to increase the steel's durability by eliminating porosity and reducing segregation. Through these techniques the falling temperature of molten steel can be raised to ensure uninterrupted casting and, thus, higher productivity. According to research, a plasma torch would be the best reheat device

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because plasma generates high, pollution-free temperatures; plasma torches allow differential heat input to the steel bath to even out temperature differences between strands; and such systems can be integrated with existing continuous casting machines.

The MEC conducted additional experiments at the Nuova Italsider's Taranto Steelworks to monitor and eliminate steel breakouts—a blemish caused by sticking between a recently solidified shell and the mold. Breakouts in continuous casters disrupt the process of sending hot slabs directly and continuously to the rolling mill without inspection or cold treatment. A breakout results in production losses and costly unscheduled maintenance. Taranto is using sensor and computer monitoring to evaluate the amount of friction between slab and ingot, the thickness of the solidified shell, and the nonsymmetrical heat exchanges between mold sides. These measurements are processed through a machine model capable of predicting breakout-inducing abnormal solidification conditions with an accuracy of better than 60 percent.

The ECSC also financed two MEC and Nuova Italsider research projects involving an electromagnetic resonance probe (ERP) to detect surface defects in cold and hot steel slabs. The development of an ERP system for detecting surface defects in hot continuous-cast slabs is essential for developing a direct steel rolling system. The ERP system detects defects of up to 2 mm deep and 50 mm long at temperatures near 1000° C. The system's identification of defects at a maximum distance of 22 mm from the slab has allowed space for an air-cooling unit to protect the resonance circuit.



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FOR OFFICIAL USE ONLY**USSR: NEUTRINO BEAMS TO BE USED IN TOMOGRAPHIC EARTH STUDIES**

Key Points: Soviet physicists at the USSR Academy of Sciences and at several universities are developing a neutrino beam generator. The neutrino beams will be used to survey the Earth's geologic makeup, detect natural resources, and track tectonic plate motion.

Soviet physicists are developing high-energy neutrino beam generators to gather information about the structure and composition of the Earth, according to the Soviet general sciences journal ZNANIYE-SILA (August 1986). Directed through the Earth from a variety of angles and points on the surface, the neutrino beams will tomographically scan in a way analogous to x-ray scanning of the human body. The beam generator will be composed of a beam extractor, a target chamber, and a decay tube. Because of the generators' unwieldy size, scientists may float them on sea-going barges. Features outlined by the beams will be recorded on detectors and analyzed by computer.

Soviet scientists will use high-energy neutrinos, which interact with the Earth's geologic strata. The neutrinos will possess charge levels ranging from 10 to 20 trillion electron volts (TeV). Neutrinos with lower charges would not be absorbed in sufficient quantities whereas neutrinos beyond the 20 TeV range would be absorbed in too great a quantity. In either case, the detectors would be unable to register the beams.

Project scientists envision practical benefits from Earth scanning such as the identification of energy and mineral resources. Underground thermoacoustic waves caused by the interaction of the neutrino beam with atoms in oil and gas deposits can be used to map these resources from thousands of kilometers away. Surface sensors will register wave variations indicating the location and boundary of deposits. Neutrino-generated muons will be used to signal the location of ore deposits to a depth of five kilometers. Surface detectors will trace the characteristic "shade" of the muons in ore beds.

The Soviets also plan to use neutrino beams in time-lapse measurements of distances between points on the ocean's surface and bottom. Precise up to a millimeter for every thousand kilometers, these measurements will help in tracking tectonic plate motion. Moreover, scientists anticipate that neutrino beam data will provide a clearer picture of the planet's deepest layers.



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FOR OFFICIAL USE ONLY**REPORTS**

REPORTS surveys science and technology trends as detailed in articles, books, and journals. It also includes summaries and listings of articles and books which may serve as potential sources for future research. Conference proceedings will occasionally be presented in this section.

CUBA: ROLE, ACHIEVEMENTS OF ACADEMY OF SCIENCES

The function of Cuba's Academy of Sciences and its R&D programs are summarized by academy president Prof Rosa Elena Simeon Negrin in an interview with the GDR periodical SPECTRUM (No. 5, 1986).

Policy Role

Simeon observed that prior to the 1959 revolution the academy had functioned only as a rendezvous for scholars. By 1962, however, it had been reorganized and was engaged in a range of scientific endeavors designed to speed the development of Cuba's economy. According to Simeon, the academy today is highly influential, serving as both coordinator and director of national science policy. She equated it to a ministry of science and technology. Having rapidly expanded in recent years, the academy has 53 research institutes and a staff of some 35,000.

Biotechnology

The academy's research and development efforts have focused primarily on the country's agrarian sector. Simeon noted that the academy is using molecular biology to improve crop strains and to produce protein-rich fodder from organic byproducts. It has also developed new disease-resistant, virus-free varieties of potato, citrus, and sugar cane.

Biochemical research has expanded the use of bagasse (the pulp left after the extraction of juice from sugar cane) as an alternative fuel source, thereby reducing heating oil consumption. In addition to its fuel applications, bagasse is also being refined for use in producing viscose fibers and paper. Within the framework of Cuba's CEMA affiliation, the academy has cooperated with the GDR in extracting from bagasse the compound furfural (an oily liquid used as a solvent and in the production of dyes, lacquers, and synthetic resins).

Nuclear Power

The academy is playing a leading role in Cuba's first nuclear power plant, which is scheduled to begin operation in 1991. Its Nuclear Research Institute, in cooperation with the GDR's Central Institute for Nuclear Research, has established departments of reactor physics, nuclear equipment, and isotope production. Simeon did not elaborate on the departments' facilities, staffing, or programs.

Medicine

In the medical field, the academy has manufactured drug compounds and has developed prenatal diagnostic techniques. Academy research in genetic engineering has focused on the production and application of monoclonal antibodies.



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FOR OFFICIAL USE ONLY**USSR: SOVIET BOOKS ON NUCLEAR POWER PLANTS**

The following titles are recent acquisitions and supplement those noted in SCIENCE AND TECHNOLOGY PERSPECTIVES Vol. 1, Nos. 4, 5, and 6.

1. RADIATION SAFETY AND NUCLEAR PLANT SAFEGUARDS

This book describes the physical and chemical processes occurring in nuclear power plants which affect formation of radiation sources and radioactive wastes. Theoretical and experimental aspects of a nuclear power plant's radiation state and consequent environmental effects are studied. The studies were conducted in the USSR. This collection of articles is intended for engineering and technical workers specializing in nuclear plant radiation safety. (Moscow "Radiatsionnaya bezopasnost i zashchita AES," ed. by Yu. A. Yegorov, 1986, 135 pp)

2. FUEL-HANDLING MACHINES FOR NUCLEAR POWER PLANTS

Essential design features of charging/discharging machines for RBMK-1000 water-cooled channel reactors are discussed. The process of loading and unloading fuel is examined and methods to improve the time factor are listed. Examples of computer programs for fuel-handling machines are also provided. This book is intended for engineering, technical, and scientific personnel engaged in the development or operation of nuclear power plant equipment. (Moscow "Pereguzochnyye mashiny kanalnykh yadernykh energeticheskikh reaktorov" by S. N. Andreyenko, Yu. A. Yevseyenkov, B. A. Konstantinov, D. A. Krotov, V. I. Skvortsov, 1986, 144 pp)

3. PRACTICAL PROBLEMS IN NUCLEAR REACTOR OPERATION (4th edition)

This book covers issues relating to nuclear reactor physics, reactor safety and efficient operation as well as neutron-physical methods for changing reactor parameters during startup and operation. Examples and solutions for practical problems are provided with a correct-response key for testing how well material has been assimilated. The book is intended for nuclear plant personnel and can also be used for advanced training of senior engineers and nuclear power plant shift managers. (Moscow "Prakticheskiye zadachi po ekspluatatsii yadernykh reaktorov" by Vladimir Ivanovich Vladimirov, 1986, 304 pp)

4. EROSION WEAR OF STEAM TURBINE PARTS

This book describes erosion wear causes in wet steam turbine blades and other parts of a power-generating facility and lists the most frequent types of damage. The book discusses methods for planning and designing wear-resistant parts in turbines subject to local dynamic pressure from fluid particles. It also examines approaches and apparatus that make it possible to reduce part wear and methodology for calculating the durability of turbine blades (with illustrated sample problems). This publication is intended for engineering and technical personnel engaged in the design, testing, and operation of steam turbines. (Moscow "Eroziya elementov parovykh turbin" by R. G. Perelman and V. V. Pryakhin, 1986, 182 pp)

(A translation of the tables of contents and annotations for the above books will appear in USSR REPORT: ENGINEERING AND EQUIPMENT.)



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USSR: SOVIET BOOK ON ELECTRONIC COMMUNICATION TECHNOLOGY

The VLT-1920 coaxial cable transmission system is examined in the 1984 book "The VLT-1920 Transmission System" ("Sistema Peredachi VLT-1920") by V.S. Baronov. The system was developed by the GDR in accordance with USSR Ministry of Communications technical specifications.

The VLT-1920 equipment and the companion VLT-24R are described in detail. The alignment and operation of the VLT-1920 as well as the electrical parameters of the line circuits are provided.

The book is intended for specialists working in the field of multichannel communications. To facilitate use of the book by technicians who must deal with manufacturer documentation for the equipment, symbols used in the GDR for components of block diagrams and circuit schematics have been retained, as well as several obsolete synonyms for terms recommended by the GOST (State Standards).

A translation of the book is available as JPRS-UPM-86-035-L.



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PREVIEWS

PREVIEWS is an annotated list of selected science and technology items being translated by FBIS. The list may also contain previously published items of wide consumer interest.

EUROPE REPORT: SCIENCE AND TECHNOLOGY

FINLAND IN ESA, EUREKA; ESA: \$10 MILLION IN 1987

As the only associate member of ESA Finland will contribute some \$10 million in 1987, and participate in remote mapping, the SOHO and CLUSTER research projects, and information transfer programs. ESA values Finland's research links with Sweden and the USSR. (Helsinki HELSINGIN SANOMAT 20 Sep 86 p 37)

EUREKA: EUROPE, FINLAND, USSR

Finland's decision to participate in EUREKA was based on scientific and economic as well as political considerations. (Helsinki UUSI SUOMI 19 Sep 86 pp 1, 8)

FRG/GDR AGRICULTURAL TRAINING EXCHANGE PROGRAM ESTABLISHED

The exchange agreement was signed on 22 September. As yet unnamed research institutes are to cooperate on protein fodder crops, genetic technology in crop cultivation and fungal diseases, and on combatting forest damage. (Hamburg DPA 22 Sep 86)

ARIANESPACE PUBLISHES NEW LAUNCH MANIFEST

Some 25 launches are planned, beginning in February 1987 and running through January 1990. (Paris AIR & COSMOS 13 Sep 86 p 70)

FRG'S SAENGER/HORUS HYPERSONIC TRANSPORT PROJECT

Albert Ducrocq comments on the design and engine technologies envisioned for the Space Transport System. (Paris AIR & COSMOS 20 Sep 86 pp 45-46)

KOREAN AFFAIRS REPORT

MID-SIZE HELICOPTERS TO BE MANUFACTURED IN SOUTH KOREA

Daewoo Heavy Industries has signed an agreement with Sikorsky to produce S-76 helicopters. Daewoo has invested some 40 billion won in this venture and expects to add an additional 20 billion won. In addition, Samsung Precision Industries is negotiating with Bell Helicopters to produce mid-size helicopters. (Seoul HANKUK KYONGJE SINMUN 29 Aug 86; Seoul MAEIL KYONGJE SINMUN 30 Aug 86)

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